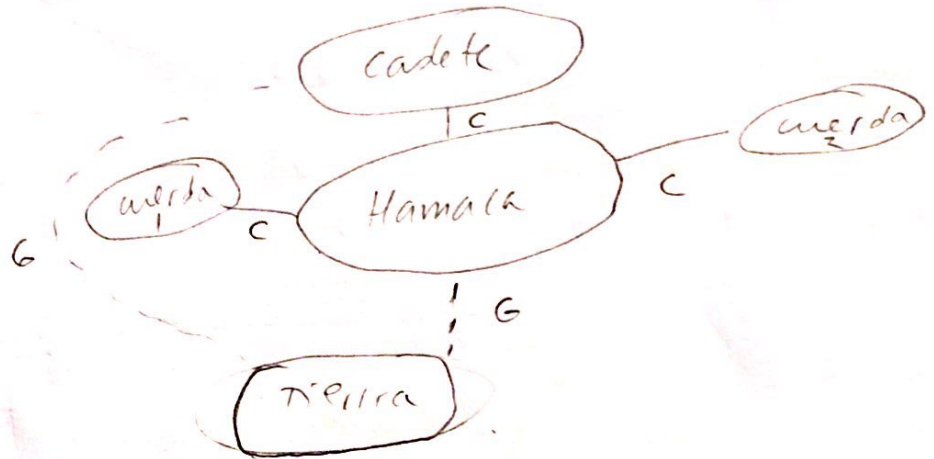
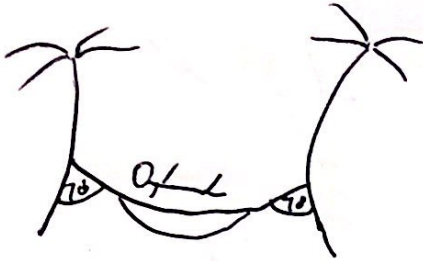


- 1) Un cadete de 60 kg de masa descansa en una hamaca cuya masa es de 10 [kg], como muestra la figura a continuación.

a) Diagrama de interacciones para el sistema.



b) Inventario

Cadete

$$- \vec{F}_{\text{contacto Hamaca} \rightarrow \text{cadete}} = \vec{F}_{H \rightarrow C}$$

$$- \vec{F}_{\text{grav. tierra} \rightarrow \text{cadete}} = \vec{P}_C$$

Hamaca

$$- \vec{F}_{\text{contacto cuerda 1} \rightarrow \text{Hamaca}} = \vec{T}_1$$

$$- \vec{F}_{\text{contacto cuerda 2} \rightarrow \text{Hamaca}} = \vec{T}_2$$

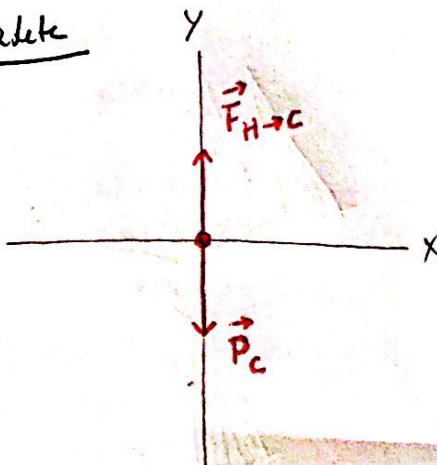
$$- \vec{F}_{\text{contacto cadete} \rightarrow \text{Hamaca}} = \vec{F}_{C \rightarrow H}$$

$$- \vec{F}_{\text{grav. tierra} \rightarrow \text{Hamaca}} = \vec{P}_H$$

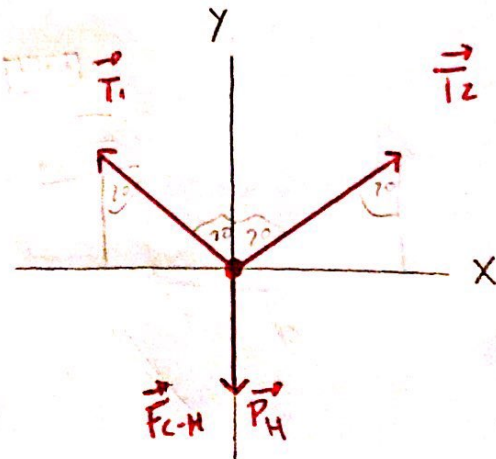
Para acción
reacción = cadete - Hamaca
 $\vec{F}_{H \rightarrow C}$ y $\vec{F}_{C \rightarrow H}$.

c) D.C.L

cadete

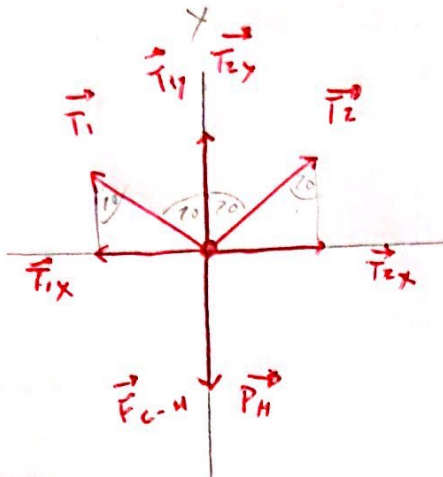


Hamaca



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Hamaca



$$\begin{aligned} \sin 20^\circ &= \frac{T_{2x}}{T_2} & \cos 20^\circ &= \frac{T_{2y}}{T_2} \\ T_2 \sin 20^\circ &= T_{2x} & T_2 \cos 20^\circ &= T_{2y} \\ \sin 20^\circ &= \frac{T_{1x}}{T_1} & \cos 20^\circ &= \frac{T_{1y}}{T_1} \\ T_1 \sin 20^\circ &= T_{1x} & T_1 \cos 20^\circ &= T_{1y} \end{aligned}$$

masa cadera = 60 kg
600 N
masa hamaca = 10 kg
100 N

d) Calcular tensión.

Hamaca

$$\sum F_y = 0$$

$$T_{2y} + T_{1y} = F_{c-H} + P_H$$

$$T_{2y} + T_{1y} = 600 \text{ N} + 100 \text{ N} \quad \vec{F}_{c-H} = \vec{F}_{H-c}$$

$$T_{2y} + T_{1y} = 700 \text{ N}$$

$$T_2 \cdot \cos 20^\circ + T_1 \cdot \cos 20^\circ = 700 \text{ N}$$

$$0,94 T_2 + 0,94 T_1 = 700 \text{ N}$$

$$\sum F_x = 0$$

$$T_{2x} - T_{1x} = 0$$

$$T_2 \cdot \sin 20^\circ - T_1 \cdot \sin 20^\circ = 0$$

$$T_2 \cdot \sin 20^\circ = T_1 \cdot \sin 20^\circ$$

$$0,34 T_2 = 0,34 T_1$$

cadera

$$\sum F_y = 0$$

$$F_{H-c} = P_c$$

$$F_{H-c} = 600 \text{ N}$$

$$0,34 \cdot x = 0,94$$

$$x = \frac{0,94}{0,34}$$

$$x = 2,76$$

$$0,94 T_2 + 0,94 T_1 = 700$$

$$0,34 T_2 - 0,34 T_1 = 0 \quad \cdot 2,76$$

$$0,94 T_2 + 0,94 T_1 = 700$$

$$0,94 T_2 - 0,94 T_1 = 0$$

$$1,88 T_2 = 700$$

$$T_2 = \frac{700}{1,88}$$

$$\vec{T}_2 = 372 \text{ [N]}$$

$$0,94 \cdot 372 + 0,94 T_1 = 700$$

$$349,68 + 0,94 T_1 = 700$$

$$0,94 T_1 = 700 - 349,68$$

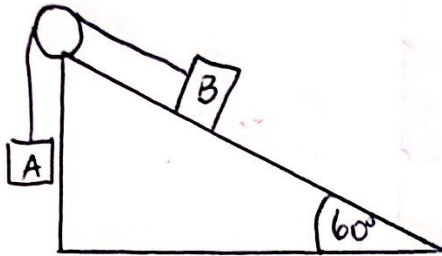
$$0,94 T_1 = 350,32$$

$$T_1 = \frac{350,32}{0,94}$$

$$\vec{T}_1 = 372 \text{ [N]}$$

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2)



Inventario

- A
- $F_{\text{contacto cuerda} \rightarrow A} = \vec{T}_A$
 - $F_{\text{gravitacional tierra} \rightarrow A} = \vec{P}_A$

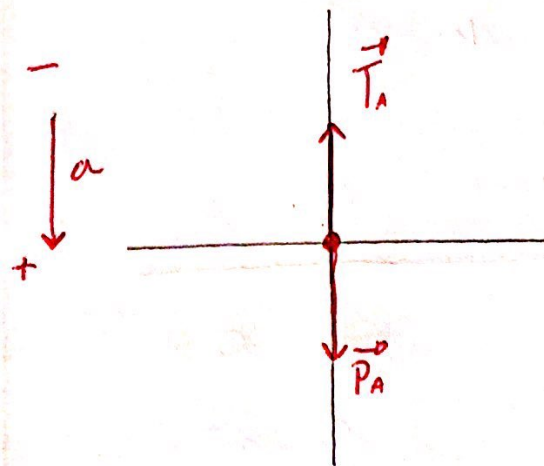
- B
- $F_{\text{contacto cuerda} \rightarrow B} = \vec{T}_B$
 - $F_{\text{contacto piso} \rightarrow B} = \vec{N}_B \text{ y } \vec{R}_B$
 - $F_{\text{grav. tierra} \rightarrow B} = \vec{P}_B$

$M = 15 \text{ kg}$
 $150 [N]$

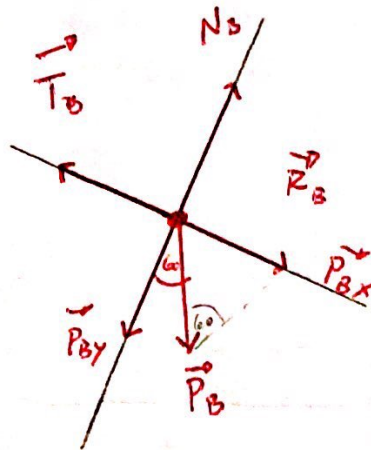
$\mu = 0,2$

b) D.C.L

A



B + A -



$\text{Sen } 60 = \frac{P_{Bx}}{P_B}$

$P_B \text{ Sen } 60 = P_{Bx}$

$\text{cos } 60 = \frac{P_{By}}{P_B}$

$P_B \text{ cos } 60 = P_{By}$

C) Determinar aceleración del Sistema.

$$m = 15 \text{ kg} \quad \mu = 0,2$$

$$150 \text{ N}$$

A

$$\sum F_y = m \cdot a$$

$$\vec{P}_A - \vec{T} = m \cdot a$$

$$150 - \vec{T} = 15 \cdot a$$

$$\begin{cases} -\vec{T} + 150 = 15a \\ \vec{T} - 144,9 = 15a \end{cases}$$

$$5,1 = 30a$$

$$\frac{5,1}{30} = a$$

$$0,17 \frac{\text{m}}{\text{s}^2} = a$$

B

$$\sum F_x = m \cdot a$$

$$\vec{T} - \vec{P}_B - \vec{P}_{Bx} = m \cdot a$$

$$\vec{T} - 15 - (150 \cdot \sin 60) = 15 \cdot a$$

$$\vec{T} - 15 - 129,9 = 15a$$

$$\vec{T} - 144,9 = 15a$$

$$\vec{T} - 144,9 = 15 \cdot 0,17$$

$$\vec{T} - 144,9 = 2,55$$

$$\vec{T} = 144,9 + 2,55$$

$$\vec{T} = 147,45 \text{ [N]}$$

$$\sum F_y = 0$$

$$\vec{N}_B = \vec{P}_{By}$$

$$\vec{N}_B = m \cdot g \cdot \cos 60$$

$$\vec{N}_B = 15 \cdot 10 \cdot \cos 60$$

$$\vec{N}_B = 75 \text{ [N]}$$

$$75 \text{ [N]}$$

$$\vec{R} = \frac{N}{\mu}$$

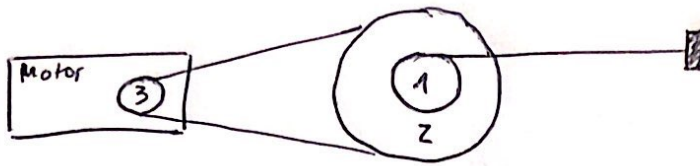
$$\vec{R} = 15 \text{ N}$$

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3)



$$R_1 = 0,1[m] \text{ (radio)}$$

$$R_2 = 0,2[m]$$

$$R_3 = 0,05[m]$$

$$3 = 800 \text{ RPM.}$$

a) Vel. angular del motor en $[RAD/s]$

$$800 \frac{\text{Rev}}{\text{min}} \cdot \frac{1 \text{ min}}{60 \text{ seg}} \cdot \frac{2\pi \text{ RAD}}{1 \text{ Rev.}}$$

$$\omega = 83,8 \left[\frac{\text{RAD}}{\text{s}} \right]$$

b) Vel. angular rueda 2.

$$V_3 = V_2$$

$$V_3 = \omega_3 \cdot r_3$$

$$V_3 = 4,19 \left[\frac{\text{m}}{\text{s}} \right]$$

$$V_2 = \omega_2 \cdot r_2$$

$$4,19 = \omega_2 \cdot 0,2$$

$$\frac{4,19}{0,2} = \omega_2$$

$$21 \left[\frac{\text{RAD}}{\text{s}} \right] = \omega_2$$

c) $\omega_1 = \omega_2 \left(r_1 \left[\frac{\text{RAD}}{\text{s}} \right] \right)$

$$V_1 = \omega_1 \cdot r_1$$

$$V_1 = 2,1 \left[\frac{\text{m}}{\text{s}} \right]$$

d) N° vueltas que da la rueda 1, cuando el cable está enrollado 80 [cm]

$$S = \theta \cdot r$$

$$0,8 = \theta \cdot 0,1$$

$$\frac{0,8}{0,1} = \theta$$

$$\theta \text{ [RAD]} = 8$$

$$2\pi = 6,28 \text{ [RAD]} \quad 6,28 \text{ [RAD]} \rightarrow 1 \text{ Rev}$$

$$8 \text{ [RAD]} \rightarrow x$$

$$1,27 \text{ Rev.}$$

$$\text{Rueda 1 da 1,27 vueltas}$$